

Glass Finds at Amorium

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IN CHAPTER 24 of *The Economic History of Byzantium*, “Pottery and Glass in Byzantium,” the authors state, “Byzantine glass wares were, generally speaking, luxury goods.”¹ A glance at any collection or exhibition catalogue of Byzantine material would seem to confirm this view, since Byzantine glass is represented usually by a few exceptional examples, notably the famous painted cup in the Treasury of San Marco, Venice.² Even some fragments—such as the base of a dish or bowl in The Metropolitan Museum of Art (acc. no. 30.95.34), recently redated to the tenth century—display a level of technical and artistic skill that marks them out as luxury ware.³ Likewise the use of glass in mosaics and cloisonné enamels forms part of a very expensive and exclusive tradition. The apparent paucity of glass finds, especially vessels, from secure archaeological contexts only serves to strengthen such a conclusion. The finds from Amorium therefore provide welcome new evidence for the Byzantine glass industry.

¹ V. François and J.-M. Spieser, in *The Economic History of Byzantium: From the Seventh through the Fifteenth Century*, ed. A. E. Laiou (Washington, D.C., 2001), 2:588. This chapter, however, remains a useful and up-to-date survey of Byzantine glass and its production; see esp. 586–88.

² See, most recently, H. C. Evans and W. D. Wixom, eds., *The Glory of Byzantium: Art and Culture of the Middle Byzantine Era, AD 843–1261* (New York, 1997), 221–22 and n. 7. Indeed, this major exhibition catalogue features no other examples, and “glass” is noticeable only by its absence from the index.

³ D. Whitehouse, L. Pilosi, and M. T. Wypyski, “Byzantine Silver Stain,” *JGS* 42 (2000): 85–93, 96.

Margaret Gill studied the Amorium assemblage of glass between 1989 and 1998, during which time she compiled an exhaustive catalogue of some 7,500 fragments.⁴ About 60 percent of these fragments belong to vessels; another 20 percent are window glass (of various types), and nearly 17.5 percent (some 1,300 pieces) comprise bracelet fragments. Many more glass fragments have been found in the excavation seasons since 1997, some of which are described briefly below.⁵ Since most of this material has been recovered from trenches within the city walls, and therefore from domestic or at least secular contexts, the glass must be seen as part of the everyday material culture at Amorium.

While it may be easy to maintain that the vast majority of the Amorium assemblage represents domestic glassware, it is more difficult to provide a clear indication of its precise date. Even though the stratigraphy and other finds suggest that much of the material belongs principally to the period between the seventh and eleventh centuries, it may be argued that the small, scattered fragments of glass are residual and so are not representative of contemporary glass production and use. There are, it is true, a number of fragments belonging to the first to third centuries that can be recognized as Roman, but these make up no more than 1 percent of the total.⁶ More problematic is our inability to distinguish unambiguously between the late Roman, early Byzantine, and middle Byzantine glass finds. In this respect, the archaeological contexts are not entirely trustworthy, since few are securely dated or form sealed deposits. Identification depends in part, therefore, on the nature of the glass finds. Since few scientific analyses have been carried out, and since such results are often inconclusive, we rely heavily on differences in shape, decoration, and technique to distinguish between groups of material. Here a large sample such as the Amorium assemblage is of greatest value.

Vessels

To date only two intact glass vessels have been recovered from the excavations at Amorium; they serve principally to underscore the mundane nature of much of the glass. Both are miniature flasks of a shape and type that seem to be common throughout the eastern Mediterranean world over a prolonged period (fig. 1).⁷ Similar examples have been found at a number of sites in Anatolia, while finds at Fustât in Egypt prompted Ralph Pinder-Wilson to note that the early Islamic apothecaries of Cairo are said to have dispensed drugs in free glass containers.⁸ Perhaps in the Byzantine world, too, drugs or perfumes came ready-packaged in such miniature glass vials. Apart from these two examples, undoubtedly used for some sort of cream, perfume, or ointment, most of the glass found at Amorium consists of small fragments and lacks any distinguishing features. From those that are diagnostic, however, it can be ascertained that the majority belongs to utilitarian vessels.

The household glassware of the inhabitants of Amorium included a wide variety of storage vessels: bottles, flasks, handled jugs, jars, and serving bowls. Drinking vessels in the form of wineglasses, goblets, beakers, and cups are also well represented. In addition, glass lamps were probably used, at least in the houses of the more affluent residents, as well as in churches and other important public buildings.⁹ The range of colors used for these vessels is limited, and certainly not as extensive as that employed for the production of glass bracelets. Likewise the number of decoration techniques is also limited. Two broad categories of decoration were practiced: the application of colored threads, most commonly in cobalt blue, to the rim, body, or base of the vessel; and the use of tongs to create a repetitive stamped design on the rim, around the body, or on

4 *Amorium Reports, Finds*, vol. 1, *The Glass (1987–1997)*, with contributions by C. S. Lightfoot, E. A. Ivison, and M. T. Wypyski, BAR International Series 1070 (Oxford, 2002).

5 The material comes from the campaigns that took place in 1998, 2000, 2001, and 2002. The glass vessel fragments found in these years are being studied in detail by Dr. B. Yelda Olcay Uçkan.

6 Gill, *Amorium Reports*, 1:259.

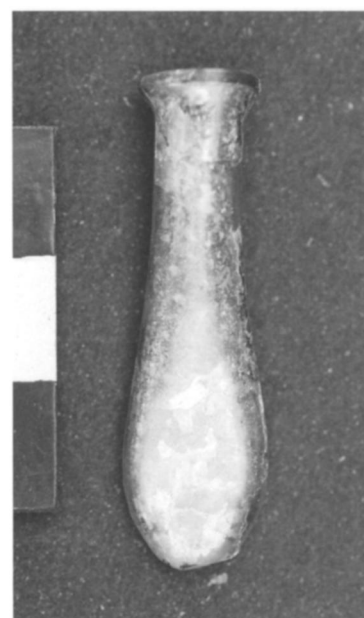
7 *Ibid.*, 58 no. 280 and fig. 1/19; *DOP* 55 (2001): 395 no. 3 and fig. L/3.

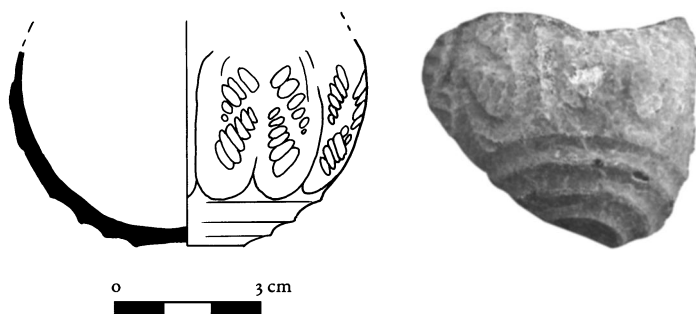
8 G. T. Scanlon and R. H. Pinder-Wilson, *Fustat Glass of the Early Islamic Period: Finds Excavated by the American Research Center in Egypt, 1964–1980* (London, 2001).

9. See also the finds from Tiberias, which include a “pharmacy group”: A. Lester, “Glass Bottles and Vials from Tiberias,” in *Annales du 15e congrès de l’Association Internationale pour l’Histoire du Verre* (Nottingham, 2003): 161–62 and fig. 4. For examples found in Turkey: C. S. Lightfoot and M. Arslan, *Ancient Glass of Asia Minor: The Yüksel Erimtan Collection* (Ankara, 1992), 215–16 nos. 142–45.

9 On possible middle Byzantine lamp fragments from the Lower City Church, see Gill, *Amorium Reports*, 1:261.

Fig. 1 Miniature glass bottle from Trench XC, 1998, context AM98/XC/76 (photo: T. Çakar)





Figs. 2–3 Cut glass vessel fragment from Trench XC, 2002, context AMo2/XC East/15 (drawing: P. Pugsley; digital image: E. M. Schoolman)

the base. Very little evidence of carving or painting was found among the vessel fragments, in marked contrast to contemporary Islamic glassware. So far only one fragment with cut decoration has been recognized as post-Roman, and it may well be an Islamic import (figs. 2, 3).¹⁰ Various explanations may be offered for the absence of these techniques from the Amorium assemblage, but the most obvious and convincing is that such “luxury” glassware was not produced in any great quantity by Byzantine craftsmen between the seventh and eleventh centuries. If such techniques had been commonly used to decorate Byzantine glass vessels, they would surely have been better represented at Amorium, which was a major and, evidently, prosperous city throughout that period.

Paradoxically, some characteristics of the plain, utilitarian glassware of Amorium find their closest parallels among the glass of the Islamic world. There is, for example, a group of broad, open bowls or dishes with an everted rim forming a thick collar.¹¹ In addition to the finds from the mid- to late seventh-century workshop at Beirut, Amorium glassware may now be compared to material from Qal’at Sem’an.¹² Likewise the Amorium assemblage includes a number of bowls or cups with a distinctive inward folded or rolled rim; similar vessels may also be found at Qal’at Sem’an.¹³ These parallels, however, should not be a surprise, since both the early Islamic and the Byzantine glass industries followed a tradition that was founded in the Late Roman period (4th–6th c.).

One of the most distinctive types of decoration found at Amorium was named Blue Coil Ware by Gill.¹⁴ This comprises mainly bowls and cups in a pale bluish green or light green glass with a cobalt blue thread trailed around the rim, sometimes with further trails lower down the side, and with a coil of blue glass forming a base ring. Examples in closed forms, however, are also represented; these may include tall-necked bottles and jugs with trefoil mouths.¹⁵ Since this trail decoration is so consistent in appearance and application, it may be regarded as the product of a single period and place of manufacture. It remains unclear whether or not Blue Coil Ware is a local ware, but the contexts in which most of the specimens have been found point to an eleventh-century date for its production.¹⁶ The long-lasting tradition of using blue threads as decoration makes it difficult to identify material from other sites as belonging to the same group.¹⁷ However, it has previously been noted that some close parallels exist among the glass finds from the St. Nicolas church at Demre in Lycia, although there they are attributed to Building Phase 2 and dated to the eighth to ninth century.¹⁸ A regional variant of the type may also be found in Greece; there

¹⁰ The fragment, found in 2002 in Trench XC East, has yet to be studied in detail. It is part of the base and lower body of a bowl or bottle, decorated with three wide horizontal grooves below a panel with a more elaborate foliate design. The context suggests a date no earlier than the mid-9th century. For the late Hellenistic, Roman, and late Roman cut glass fragments, see Gill, *Amorium Reports*, 1:46 no. 124, 47 no. 131, 62 nos. 320 and 322, 146 no. 153, and 167 nos. 382–84.

¹¹ *Ibid.*, 1:51, nos. 181–83, 149 nos. 177–78, and 162 nos. 328–31.

¹² S. Jennings, “The Roman and Early Byzantine Glass from the Souks Excavations: An Interim Statement,” *Berytus* 43 (1997–98): 114 and 128–29, fig. 8 (where they are regarded as Late Roman); D. Foy, “Un atelier de verrier à Beyrouth au début de la conquête islamique,” *Syria* 77 (2000): 251 and 272, figs. 11 and 22; O. Dussart, “Les verres islamiques de Qal’at Sem’an,” in *Annales du 15e congrès*, 172 and fig. 2.2–2d (n. 8 above); also T. Winter, “The Glass Vessels from Horvat Hermeshit (1988–1990),” *Atiqot* 34 (1998): 10* and fig. 2. 1–4.

¹³ Gill, *Amorium Reports*, 1:52 nos. 190–94, 150 nos. 187–90; Dussart, “Verres islamiques,” 172 and figs. 2.5–5d, 3.1–1c; also R. Pollak, “Early Islamic Glass from Caesarea: A Chronological and Typological Study,” in *Annales du 15e Congrès*, 167, nos. 21–22.

¹⁴ *Amorium Reports*, 1:44–6 nos. 99–116, 142–44 nos. 111–34.

¹⁵ *Ibid.*, 1:56 no. 243, 164 no. 352.

¹⁶ For example, no fragments of Blue Coil Ware were recovered from the trench (AB Fosse) immediately outside the Lower City walls, which contained material principally of the 5th–7th century (*ibid.*, 1:12).

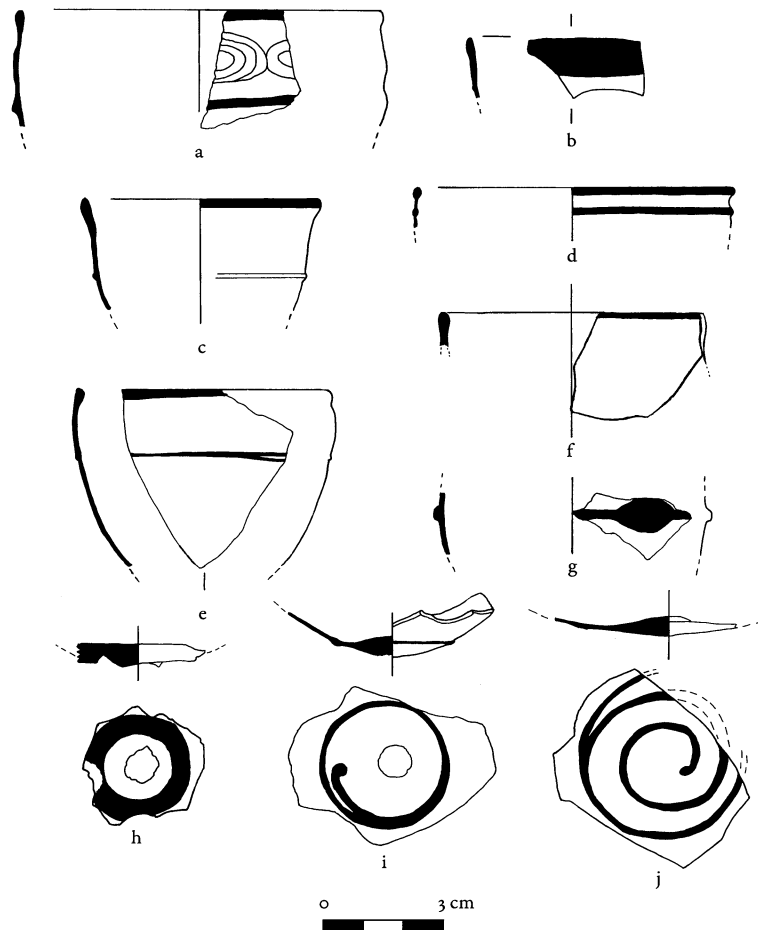
¹⁷ Many blue trail fragments have been found at Beirut, including trefoil mouths, which are probably of local manufacture (see Foy, “Atelier de verrier,” 263–68, esp. fig. 19, nos. 1–5).

¹⁸ *DOP* 53 (1999): 341 and n. 28. Note especially the hemispherical bowls found at Demre; compare fig. 4e (example from Context AMo2/XC309) with S. Y. Ötügen,

“Demre Aziz Nikolaos Kilisesi Kazısının Ortaçağ Araştırmalarına Katkıları,” *Ege Üniversitesi Sanat Tarih Dergisi* 9 (1998): 98 fig. 2/h and j.

is, for example, a small assemblage of vessel fragments with a dark-green trail decoration that has been found at Nichoria in Greece and dated “firmly in the late tenth to early twelfth century.”¹⁹ Certainly many of the recent finds of Blue Coil Ware at Amorium have come from contexts that can with some assurance be associated with middle Byzantine occupation levels. All but one of the examples illustrated here come from Trench XA, where domestic and light-industrial complexes have been uncovered (fig. 4).²⁰ One fragment was retrieved from the same context as several silver-stained bracelets (see figs. 4j, 5e, f, and i).²¹

Some bowls have, in addition to blue threads, impressed decoration. Although less common than vessels decorated solely with trails, several examples of this type have been recorded, and new fragments have come to light in recent years (fig. 4a).²² The shape, fabric, and style of the vessels with tonged decoration are the same as those of Blue Coil Ware, and their contexts may be taken to confirm their contemporaneity. However, there also exists a category of vessel that was decorated solely with impressed designs.²³ Pinder-Wilson in his introduction to *Fustat Glass of the Early Islamic Period* stated that “tonged decoration seems to be unique to the glass houses of the Islamic world.”²⁴ The Byzantine use of such decoration was apparently previously unknown in the context of medieval glass. The new evidence from Amorium, however, proves without doubt that Byzantine glass workers used the same technique, even if only on a relatively limited scale.²⁵



19 W. A. McDonald, W. D. E. Coulson, and J. Rosser, eds., *Dark Age and Byzantine Occupation: Excavations at Nichoria in Southwest Greece* (Minneapolis, 1983), 3: 409–10, nos. 544, 551–53, and 556–57, pls. 12–23, 12–24.

20 For a brief report on earlier excavations in this area, see *DOP* 52 (1998): 327–28; for coins, see *ibid.*, 331–32, fig. 15. During the 2001 and 2002 seasons 5 more anonymous folles (of Class A2) and 2 signed folles of Constantine X (1059–1067) were also identified from various contexts in Trench XA. For the 1996 glass finds, consult the concordance in Gill, *Amorium Reports*, 1:245–46.

21 Note also that the body fragment in fig. 4g comes from the same context as the bracelet in fig. 5b.

22 Gill, *Amorium Reports*, 1:143, nos. 122–24—all from the Upper City, whereas the example illustrated in fig. 4a comes from Trench XA in the Lower City.

23 *Ibid.*, 60–61 nos. 304–7, 165 nos. 370–72.

24 From p. 10 (n. 8 above).

25 Apart from the single fragment of cut glass mentioned above (p. 175 and n. 10), there is very little evidence for any pre-Turkish Islamic material at Amorium. The only Arab find is an inscribed bronze weight: R. M. Harrison, “Amorium 1988, the First Preliminary Excavation,” *AnatSt* 39 (1989): 171, 173–74, pl. 48b.

Fig. 4 Finds of Blue Coil Ware from Trenches XA and XC, 2002. Contexts: (a) AM02/XA-1/43, (b) AM02/XA-2/13, (c) AM02/XA-2/5, (d) AM02/XA-2/47, (e) AM02/XC/309, (f) AM02/XA-1/42, (g) AM02/XA-2/32, (h) AM02/XA-1/39, (i) AM02/XA-1/37, (j) AM02/XA-2/52 (drawing: P. Pugsley)

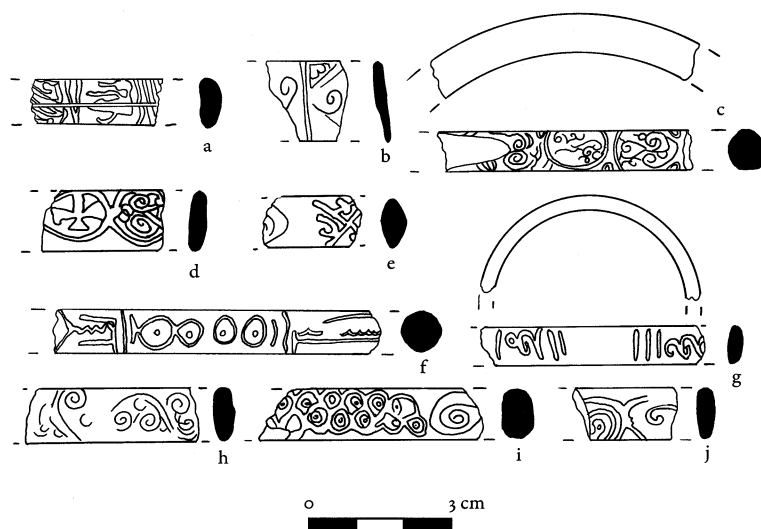
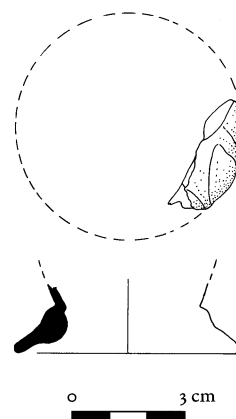


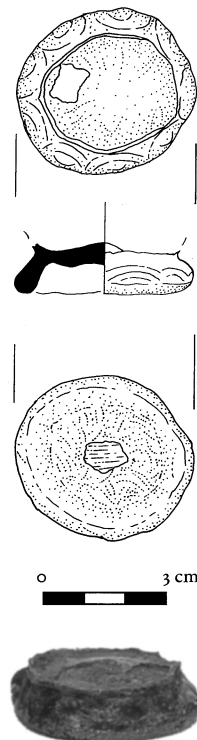
Fig. 5 Decorated bracelet fragments from Trench XA, 2002. Contexts: (a) AMo2/XA-2/16, (b) AMo2/XA-2/32, (c) AMo2/XA-2/37, (d) AMo2/XA-2/24 = fig. 12, (e) AMo2/XA-2/52, (f) AMo2/XA-2/52, (g) AMo2/XA-2/24, (h) AMo2/XA-2/48, (i) AMo2/XA-2/52, (j) AMo2/XA-1/24 (drawing: P. Pugsley)

Fig. 6 Base fragment with impressed decoration from the Lower City Church, 1998, context AM98/A1/18 (drawing: P. Pugsley)



The impressed designs on the Amorium examples appear to be less sophisticated and attractive than those used by their Islamic counterparts, but on the other hand their application was probably more varied and inventive. The use of tongs or pincers is, as Pinder-Wilson rightly observed, “generally restricted to open vessels.” Most of the impressed designs at Amorium are likewise applied to small bowls, either on a broad, folded rim or, more frequently, to the side of the vessel just below the rim. As already mentioned, the Amorium assemblage provides evidence for the combination of an impressed design with trailed decoration. Very few Islamic vessels have been found that display the same combination of techniques, but two have recently been published. There is a handled cup, acquired in Cairo and now in the Museum für Islamische Kunst, Berlin, and another cup from Mazar-i Sharif in Afghanistan.²⁶ Even more unusual are two fragments found at Amorium during the last few years. Both display a pressed decoration that has been applied to the foot ring. One (fig. 6) was found in the narthex of the Lower City Church, while the other (figs. 7–8) comes from a context in the Byzantine baths complex (in a late, post-bathhouse phase) that also produced three anonymous folles, all of Class I (dated ca. 1075–80).²⁷ No parallels for this type of base decoration are known in the Islamic East, whereas there is a single fragment from Corinth, published many years ago by Gladys (Davidson) Weinberg, who described it as produced by the mold-blown technique.²⁸ The fragment can now be seen to represent a category of glassware that is typically Byzantine, and its attribution to the eleventh century seems fully justified. The use of tonged decoration on Islamic glass is dated principally to the ninth and tenth centuries; so, for example, vessels with impressed designs were found among the glass fragments at Samarra. The examples from Amorium probably date to the same period or, possibly, belong slightly later in the late tenth and eleventh centuries. There is no evidence to provide a link between the two traditions, but it is tempting

Figs. 7–8 Base fragment with impressed decoration from Trench XC, 2001, context AM01/XC/139 (drawing: P. Pugsley; photo: T. Çakar)



26 S. Carboni and D. Whitehouse, *Glass of the Sultans* (New York, 2001), 132–33, no. 49; S. Carboni, *Glass from Islamic Lands* (New York, 2001), 288, no. 3.57; compare also a bottle in The Metropolitan Museum of Art, New York (acc. no. 1994.11).

27 *DOP* 58 (2004): 361. Also from the same context (Context XC139) comes the silver-stained bracelet fragment in fig. 13.

28 *The Minor Objects*, vol. 12 of *Corinth* (Princeton, N.J., 1952), 107 no. 690, fig. 12.

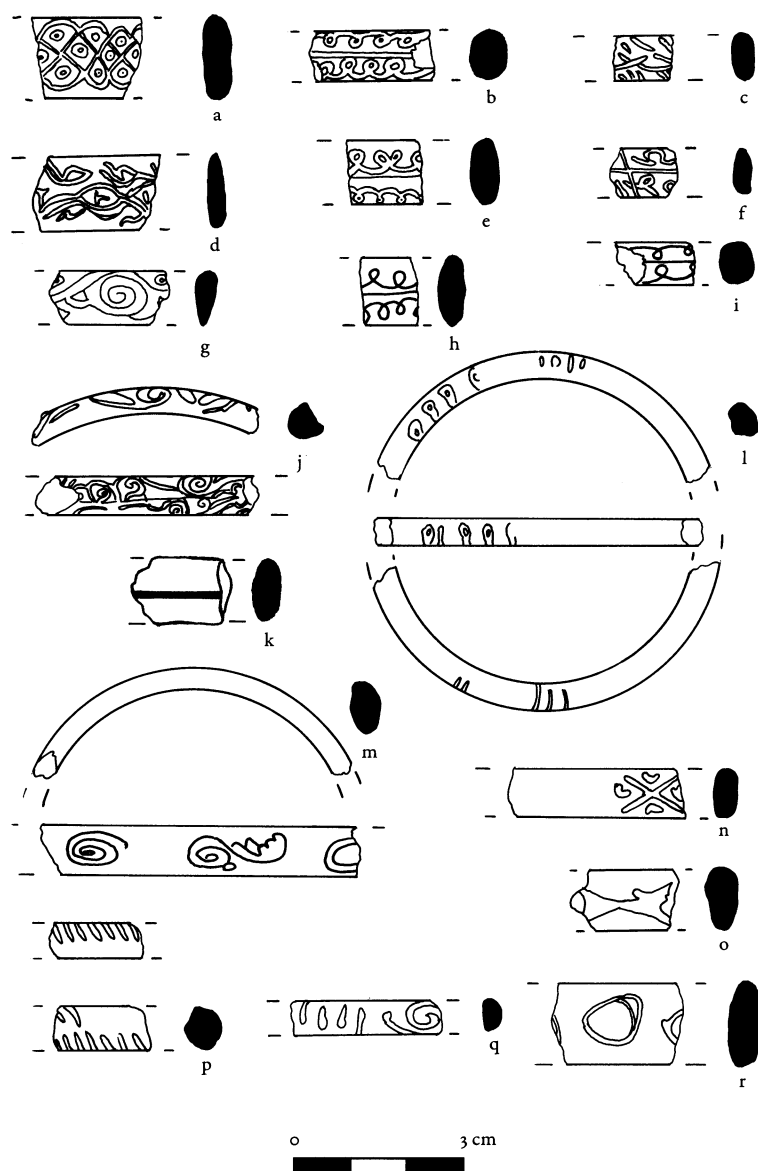
to think that, as the Byzantines expanded into the former Arab territories of Cilicia, northern Syria, and Mesopotamia in the second half of the tenth century, the use of impressed decoration might have been one of the techniques that they adopted from the Islamic world.

Another smaller but equally interesting group of fragments was identified by Gill as Red Streak Ware because it is formed from a dark red glass mixed with a translucent bluish green.²⁹ This group finds some far-flung parallels, not only among Islamic glassware but also that of northwest Europe, notably from sites in northern England. The relationship (if any) between these groups, however, is as yet difficult to explain. The use of brightly colored glass for vessels has already been noted as infrequent among the Amorium finds. A striking exception is the growing number of fragments in a brownish red glass. Some of these, when the thinness of the vessel wall allows light to penetrate the apparent opacity of the glass, display the attributes of dichroism.³⁰ Analyses

29 *Amorium Reports*, 1:59 nos. 292–93, 163 no. 336.

30 *Ibid.*, 163 no. 337, 253–55.

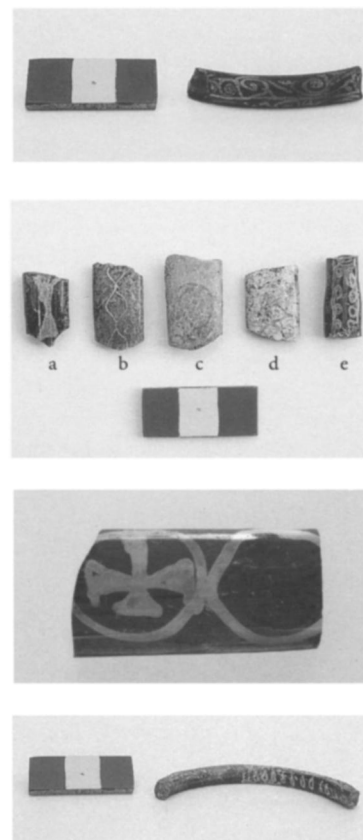
Fig. 9 Decorated bracelet fragments from Trench XA, 2001. Contexts: (a) AMo1/XA/104 = fig. 11d, (b) AMo1/XA/100 = fig. 11e, (c) AMo1/XA/94, (d) AMo1/XA/100 = fig. 11b, (e) AMo1/XA/100, (f) AMo1/XA/100, (g) AMo1/XA/86, (h) AMo1/XA/100, (i) AMo1/XA/100, (j) AMo1/XA/96 = fig. 10, (k) AMo1/XA/100, (l) AMo1/XA/61, (m) AMo1/XA/100, (n) AMo1/XA/100, (o) AMo1/XA/94 = fig. 11a, (p) AMo1/XA/100, (q) AMo1/XA/100, (r) AMo1/XA/100 = fig. 11c (drawing: P. Pugsley)



Figs. 10–11 Glass bracelet fragments with silver-stained decoration from Trench XA, 2001; see also fig. 9 (photos: T. Çakar)

Fig. 12 Glass bracelet fragment with silver-stained decoration in two contrasting colors, white and red, from Trench XA, 2002; same as fig. 5d (digital image: C. S. Lightfoot)

Fig. 13 Glass bracelet with decoration on inner surface from Trench XC, 2001, context AMo1/XC/139 (photo: T. Çakar)



have shown that the effect is produced by the addition of tiny particles of copper oxide to the batch.³¹ Parallels have been sought elsewhere, but as yet there is no clear evidence that other examples of red opaque glass from West or East are in fact dichroic. Although the dichroism of the Amorium examples may have been accidental, and its appearance is only dimly visible at best, the creation of such glass requires a certain technical expertise and attests to the existence of a discerning clientele. Whether or not it should be classed as a “luxury” product, the dichroic glass of Amorium appears to be uniquely Byzantine and unlike the dichroic glass that was produced in late antiquity. Not only do the colors in transmitted and reflected light differ from the earlier examples, but also the fragments from Amorium all seem to belong to fairly small free-blown vessels, mainly goblets or wine cups. The discovery during the 2002 season of a fire-warped fragment from a destruction layer (probably associated with the sack of Amorium in 838) at the center of the site appears to confirm the earlier conclusion that this small group of fragments belongs to the eighth and early ninth centuries.

The publication of the corpus of vessel shapes and types found at Amorium will, it is hoped, aid others in identifying more Byzantine glassware, especially in Anatolia. Until now scholars have drawn largely on the material from Sardis or Corinth.³² The former provides material that dates only as late as the sixth and first half of the seventh century, while the attribution of the two glass workshops at Corinth has been the source of much scholarly discussion. Indeed David Whitehouse has argued that activity at the workshops should be dated to the thirteenth and fourteenth centuries during the Frankish occupation of Corinth, rather than to the eleventh and twelfth centuries.³³ Nevertheless, as with small finds in other material, there are some striking parallels between some of the glass fragments at Corinth and the finds at Amorium.³⁴ At the latter site, the production, and virtually all use, of glass definitely ceased when the Byzantine city was abandoned toward the end of the eleventh century.

Bracelets, Beads, and Rings

Silver-stained bracelets are common at sites throughout the Byzantine Empire and have been found in abundance at Amorium, although they make up only about 15 percent of all the bracelet finds. The technical aspects of such bracelets have been investigated most recently in an article by David Whitehouse, Lisa Pilosi, and Mark Wypyski, but little work has been done as yet to put glass bracelet production in context.³⁵ Gill’s detailed recording of the Amorium material has shed some light on aspects of this industry.³⁶ For example there is a strong preference for one color—65–75 percent of all the fragments (decorated and plain) are made using a blue glass. However, those with an external thread decoration are predominantly green—more than 80 percent. Nonetheless, there is no strict conformity of production, and examples are known in a wide variety of colors and shapes (that is, in cross section), as well as in size and type of decoration. This diversity suggests small-scale production carried out by individual craftsmen. On the other hand, the huge number of bracelets that are known from sites stretching from Greece and the Balkans to eastern Anatolia and even beyond implies that the industry was widespread.³⁷ The fact that the same colors and forms of decoration appear to be used repeatedly also suggests that the industry catered to a fairly conservative market. Why glass bracelets were so popular, especially in middle Byzantine times, remains a mystery, however. Here just a few examples of the recent finds are illustrated (figs. 5, 9–13).³⁸

31 Ibid., 256–58. The analyses were carried out by Mark T. Wypyski, associate research scientist, Sherman Fairchild Center for Objects Conservation, The Metropolitan Museum of Art.

32 A. von Saldern, *Ancient and Byzantine Glass from Sardis* (Cambridge, Mass., 1980); G. R. Davidson, “A Medieval Glass Factory at Corinth,” *AJA* 44.3 (1940): 297–324; see also Davidson, *Minor Objects*, 83–90.

33 D. Whitehouse, “Glassmaking at Corinth: A Reassessment,” in *Ateliers de verriers: De l’Antiquité à la période pré-industrielle*, ed. D. Foy and G. Sennecquier (Rouen, 1991), 73–82; compare the comments of John Rosser in *Nichoria*, 408–9 (n. 19 above). See also in this volume p. 168, n. 73.

34 See, for example, Gill, *Amorium Reports*, 1:58 nos. 277–78.

35 “Byzantine Silver Stain,” 85–93, 96 (n. 3 above).

36 *Amorium Reports*, 1:79–98 and 183–219, with color illustrations on 1:182, pls. 11–14; *DOP* 55 (2001): 395–98 and fig. M.

37 Finds from other sites are listed in Gill, *Amorium Reports*, 1:261–62 nn. 21, 23–26. It has recently been noted that such bracelets “hardly reached this region” (Israel, and the Middle East in general), but it is wrong to call them “bracelets of Medieval southeastern Europe”: M. Spaer et al., *Ancient Glass in the Israel Museum: Beads and Other Small Objects* (Jerusalem, 2001), 205, no. 484.

38 The large number of bracelet fragments found in Trench XA was noted as early as the first season of excavation there in 1986: *DOP* 52 (1998): 328.

Other questions, too, need to be addressed. For example, did the same craftsman as the one who made the bracelets themselves add the “painted” decoration of the silver-stained and enameled examples? This would seem unlikely. On the other hand, some of the Amorium examples show that the decoration was in all likelihood added to straight glass rods before they were reheated and turned into bracelets. There are, for example, specimens where the decoration continues under the overlap at the join, where damage was caused to the design by the pontil scar, or where the decoration is mistakenly found on the inside of the hoop (figs. 91, 13). So it is possible that the craftsman who decorated the bracelets worked closely together with the actual bracelet maker, even though their efforts sometimes ended up at odds with each other. Alternatively this evidence could prove that the bracelet maker simply bought prepared rods of painted glass, possibly from a more central source. Certainly the similarity of some of the designs, as well as their wide distribution, suggests that the industry was well organized and catered to a large market.

While the “painted” bracelets attract most attention and interest because of their decoration, they represent only a fraction of the bracelet fragments in the Amorium assemblage. Plain monochrome bracelets make up the largest group, but even these vary greatly in their size, shape, and color. One type is worth special mention—the bracelets made from an opaque red glass (fig. 14), which finds its closest parallel in mosaic tesserae.³⁹ Another item that appears in opaque red glass is an attractive pendant seal (figs. 15–18), picked up by chance as a stray find in the Lower City in 1996. It was overlooked during the compilation of Margaret Gill’s catalogue, but it certainly deserves attention. The intaglio decoration on the bottom of the elongated pyramid depicts a winged animal, possibly a horse.⁴⁰

The shared use of opaque red glass may indicate that bracelet makers and mosaicists exploited, at least to some extent, the same sources of glass. Careful study of the contexts of the bracelet fragments also shows that plain and decorated examples occurred together, and so they should not be classified as a progression or development of styles or fashions. Indeed the use of opaque red threads on decorated bracelets, including some “painted” examples, seems to confirm the contemporaneous nature of many of the different types.⁴¹ Whether this fact might then indicate varying price levels, and thus economic and social distinctions among the buyers and wearers of Byzantine glass bracelets, remains, however, an open question.

In addition bracelets should not be viewed in isolation, for glass was also used for other types of jewelry.⁴² A number of glass beads—some relatively small, plain spherical beads in a dark blue glass—have been recovered from the excavations at Amorium.⁴³ They come probably from necklaces (or, possibly,

39 For other examples, see Gill, *Amorium Reports*, 1:80 nos. 323–24 (8 examples), 185 nos. 399–400 (5 examples).

40 Although no close parallel in glass has been found for this seal, a comparable find is a stone seal encased in an openwork silver mount with a suspension ring: C. Stiegemann, ed., *Byzanz—Das Licht aus dem Osten: Kult und Alltag im Byzantinischen Reich vom. 4. bis 15. Jahrhundert* (Mainz am Rhein, 2001), 240–41, no. III.14. See also the bronze seals found at Corinth: Davidson, *Minor Objects*, 311, 317, nos. 2676–84, pl. 128 (n. 28 above).

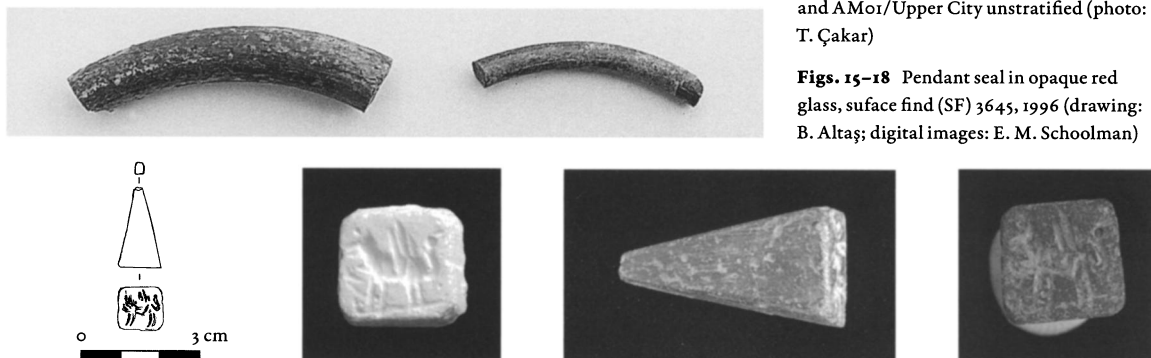
41 Gill, *Amorium Reports*, 1:212 nos. 685 and 690, pl. 13; 214 no. 716. Another fragment of a plain, opaque red bracelet, found in 2001, comes from the same context in Trench XA (Context 100) as several decorated bracelets: see fig. 9b, d–f, h–i, k, m–n, and p–r.

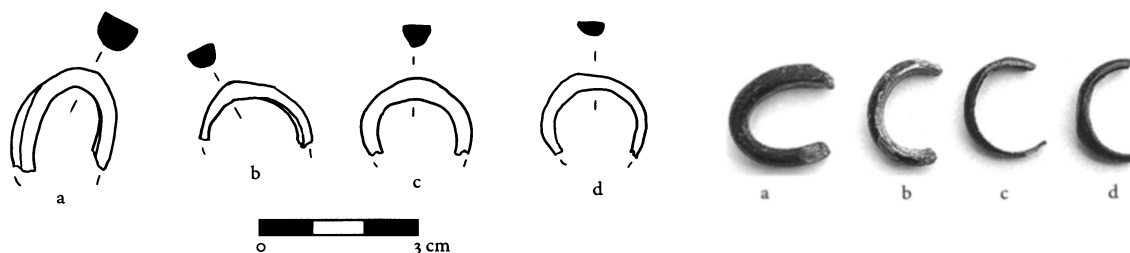
42 As yet no examples of Byzantine glass weights have been found at Amorium, perhaps because the excavations have not yet reached early Byzantine levels. But, by inference, it might also indicate that glass weights were not commonly used in the middle Byzantine period. For a hoard of 21 stamped weights found at Sardis, see M. M. Fulghum and F. Heintz, “A Hoard of Early Byzantine Glass Weights from Sardis,” *AJNum*, 2nd ser., 10 (1998): 105–20.

43 Gill, *Amorium Reports*, 1:99 nos. 571–74, 222 nos. 788–98; *DOP* 55 (2001): 395–97, nos. 1–3 and fig. M/1–3.

Fig. 14 Plain bracelet fragments in opaque red glass, from contexts AM98/XC/41 and AM01/Upper City unstratified (photo: T. Çakar)

Figs. 15–18 Pendant seal in opaque red glass, surface find (SF) 3645, 1996 (drawing: B. Altaş; digital images: E. M. Schoolman)





pendant earrings), and despite the inherent problem of dating such items, it is likely that they, too, belong mainly to the middle Byzantine period.⁴⁴ Fragments of glass rings have also been found, not in the same overwhelming quantity as the bracelets but nevertheless in significant numbers, suggesting that they were another popular form of personal adornment in Byzantine times (figs. 19–20).⁴⁵ Did the craftsmen who made the bracelets make rings as well? Is it possible to contemplate a separate glass industry for such objects, distinct from the one that supplied glass vessels and window glass or, indeed, glass mosaic tesserae?⁴⁶

Conclusions

These questions inevitably lead to the fundamental problem of Byzantine glass production itself. There is as yet no conclusive proof that glass vessels or other objects were produced in any quantity at Amorium. There is evidence, on the other hand, for a certain amount of recycling of glass mosaic tesserae during the refurbishment of the Lower City Church in the late ninth and tenth centuries.⁴⁷ Large quantities of glass would have been needed for the mosaics alone, and it remains unclear where the sources of supply were located or what form they took. In addition glass was used for the windows, for hanging lamps, and even for a decorative glass mosaic *omphalos* in the center of the *opus sectile* floor of the nave.⁴⁸ All these types of glass may have been produced by itinerant glass workers or by craftsmen brought in on special commission, which does not, however, solve the problem of where the makers got their supplies of raw glass.

Despite all the unanswered questions, the glass assemblage from Amorium offers a good introduction to the scale and diversity of the Byzantine industry, particularly during the tenth and eleventh centuries. The number of vessel fragments alone indicates that glass must have played an important role in everyday life at Amorium. Much of the glassware is plain and utilitarian, but the more elaborate types, notably the dichroic vessels and the silver-stained bracelets, support the view that glass retained its appeal and attractiveness throughout the Byzantine period.

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Figs. 19–20 Glass ring fragments from the Lower City, 2001. Contexts: (a) AMo1/Surface, (b) AMo1/XA/60, (c) AMo1/XC/145, (d) AMo1/XA/49 (drawing: P. Pugsley; photo: T. Çakar)

44 For an example of glass necklace beads, see D. Papanikola-Bakirtzi, ed., *Everyday Life in Byzantium* (Athens, 2002), 404, no. 507 (dated 12th–14th c.).

45 For other examples, already published: Gill, *Amorium Reports*, 1:99, nos. 559–69, 221 nos. 769–84 (the last example has white “painted” decoration); *DOP* 55 (2001): 397 no. 4 and fig. M/4. Glass finger rings were not represented among the jewelry in the recent exhibition in Thessalonike: Papanikola-Bakirtzi, *Everyday Life*, 402–53.

46 Most of the bracelet fragments found at Corinth are associated with only one of the two glass workshops excavated there—the northeast factory: G. D. Weinberg, “A Medieval Mystery: Byzantine Glass Production,” *JGS* 17 (1975): 141 and fig. 31.

47 J. Witte-Orr, “Technical Study of Frescoes and Mosaics from the Lower City Church,” in *Amorium Reports*, vol. 2, *Research Papers and Technical Reports*, ed. C. S. Lightfoot, BAR International Series 1170 (Oxford, 2003), 146–47 and pl. X/39.

48 *AnatSt* 44 (1994): 109 and pl. xviii; *DOP* 55 (2001): 373 and figs. 1–2.